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UNITED STATES DEPARTMENT OF AGRICULTURE
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BUREAU OF AGRICULTURAL AND INDUSTRIAL CHEMISTRY

✓ LIST OF PUBLICATIONS AND PATENTS,

of the
Northern Regional Research Laboratory
Peoria, Illinois

July - December 1952

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PUBLICATIONS

[Publications marked (*) are not available for distribution]

BLEACHING STUDIES ON MONOSULPHITE WHEAT STRAW PULP.

G. H. Nelson, L. E. Talley, and S. I. Aronovsky.

TAPPI 35(7): 301-305. July 1952.

Wheat straw pulped by the monosulfite process was bleached by single-stage and three-stage procedures. Various factors in the bleaching operation such as temperature, pH, pulp consistency, chlorine partition factor, and time of bleaching were investigated. Optimum conditions for single-stage bleaching were: pulp consistency of 6 to 16 percent; pH of 7 to 9; and temperature of 30° to 50° C. Optimum conditions for three-stage bleaching were: use of 50 to 70 percent of chlorine for the first stage at room temperature and pulp consistency of 4 to 8 percent; use of 1 percent sodium sulfite and 1 percent sodium carbonate (basis dry unbleached pulp) at 80° C. for the alkaline extraction stage; and use of hypochlorite at a consistency of 6 to 16 percent; pH of 7 to 9; and temperature of 30° to 40° C. for the third stage.

CARBOHYDRATE CONSTITUENTS OF SOYBEAN "LECITHIN".

C. R. Scholfield, Herbert J. Dutton, and Robert J. Dimler.

Jour. Amer. Oil Chem. Soc. 29(7): 293-298. July 1952.

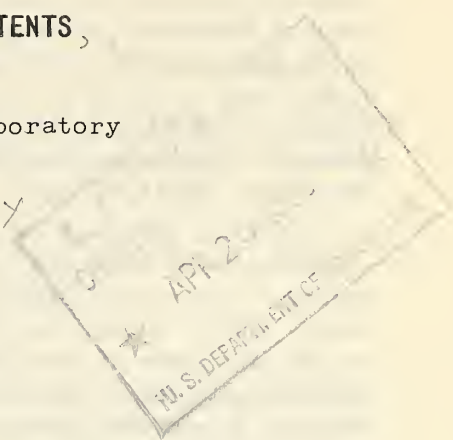
The carbohydrates present in commercial soybean lecithin were found to consist of two types: free sugars which were removed by extraction with 55 percent alcohol, and bound sugars which remained with the phosphatides. The free sugars consisted mainly of sucrose and stachyose with a smaller amount of raffinose. The greater part of the bound sugars were found with the more hexane-soluble phosphoinositides and consisted of galactose, mannose, and arabinose.

MICRODETERMINATION OF PYRUVIC AND α -KETOGLUTARIC ACIDS.

H. J. Koepsell and E. S. Sharpe.

Arch. Biochem. 38: 443-449. July 1952.

A colorimetric micro procedure for simultaneous determination of pyruvic and α -ketoglutaric acids in mixtures is described. The method is modified from that of Friedemann



and Haugen. The yellow color of the 2,4-dinitrophenylhydrazones of the acids, and the red colors produced on subsequent alkali treatment, are measured. The range is from 0.10 to 0.25 micromole of total keto acid contained in 1 ml. of sample. Each acid is determined within about 0.004 micromole at the lower concentration level, and approximately proportional or slightly improved precision is obtained at other levels.

STUDIES ON VARIATION AND MUTATION IN ASHBYA GOSSYPII.

Thomas G. Pridham and Kenneth B. Raper.

Mycologica 44(4): 452-469. July-August 1952.

A practical procedure for the evaluation of riboflavin production by substrains of *A. gossypii* was developed. By employing peptone and increased concentrations of selected corn steep liquor in fermentation media, by careful attention to stock cultures, and by critical control of inoculum preparation and use, yields of the order of 100 micrograms of riboflavin per milliliter of fermentation medium were regularly obtained with the parent strain. The addition of sodium dithionate to stock culture media in 0.1-percent concentration enhanced pigment formation and tended to maintain the organism in its highly flavinogenic state. Attempts to produce mutant substrains characterized by substantially increased flavinogenesis were unsuccessful. The mutagenic agents employed included ultraviolet radiation, and nitrogen mustard. Some clones developed from spores exposed to mutagenic agents at first appeared to possess enhanced flavinogenic capacities, but such improvement disappeared upon subsequent and repeated cultivation.

CONTINUOUS STERILIZATION OF MEDIA IN BIOCHEMICAL PROCESSES.

V. F. Pfeifer and Chas. Vojnovich.

Indus. and Engin. Chem. 44(8): 1940-1946. August 1952.

Information is reported on the practicability of continuous sterilization in the preparation of media to be used in commercial biochemical processes. Continuous sterilization is shown to overcome many difficulties of batch sterilization, and in addition is adaptable to instrumentation so that the entire sterilization and cooling processes may be carried out automatically. Pilot-plant data are presented to show the effects of time and temperature in the continuous sterilization of various commercial media to be used for producing riboflavin, vitamin B₁₂, itaconic acid, sodium gluconate, fungal amylase and butanol. Continuous sterilization was necessary in some of these fermentations to get satisfactory yields. In others it substantially improved the yields. Design of continuous sterilizers for pilot plant and commercial use is discussed and some commercial installations are described.

FRACTIONATION OF SOYBEAN PHOSPHATIDES WITH ISOPROPYL ALCOHOL.

Turid Wik, C. R. Scholfield, and J. C. Cowan.

Jour. Amer. Oil Chem. Soc. 29(8): 345-347. August 1952.

Isopropanol, which has many advantages as a commercial solvent, gave useful separations of soybean phosphatides. When commercial crude phosphatides were extracted 5 times with a total of 6.5 ml. isopropanol per gram at 40° C., 31.5 percent oil, 12.0 percent lecithin, and 5.5 percent cephalin were dissolved. Practically all the inositol containing material and about 77 percent of the sugars remained insoluble.

PEPTIZATION OF SOYBEAN MEAL PROTEIN. EFFECT OF METHOD OF DISPERSION AND AGE OF BEANS.

Allan K. Smith, Paul A. Belter, and Vernon L. Johnsen.
Jour. Amer. Oil Chem. Soc. 29(8): 309-312. August 1952.

In a re-examination of the factors affecting the dispersion of soybean meal nitrogen in water, new information was obtained on the effects of stirring, temperature, age and variety of the beans, pH of the system, and dispersion in Duponol solutions at various pH values. Results are compared with an earlier method for determination of water-soluble nitrogen (pH 6.6) in solvent-extracted soybean meal.

POLYMERIZATION OF DRYING OILS. VI. CATALYTIC POLYMERIZATION OF FATTY ACIDS AND ESTERS WITH BORON TRIFLUORIDE AND HYDROGEN FLUORIDE.

C. B. Croston, I. L. Tubb, J. C. Cowan, and H. M. Teeter.
Jour. Amer. Oil Chem. Soc. 29(8): 331-333. August 1952.

Boron trifluoride, boron trifluoride etherate, and hydrogen fluoride have been investigated as catalysts for the polymerization of soybean fatty acids and esters. With these catalysts, polymerization was relatively rapid under optimum conditions and up to 70-percent yields of polymer were obtained.

STRAW PULP-WOOD PULP BLENDS FOR VARIOUS TYPES OF PAPERS.

S. I. Aronovsky, A. J. Ernst, R. J. Seidl, and R. M. Kingsbury.
TAPPI 35(8): 351-356. August 1952.

Illinois combined wheat straw was pulped by the mechano-chemical process, bleached, and blended with Lake States wood pulps to produce typical magazine, book, newsprint, bond, bag, waxing, and greaseproof papers on an experimental Fourdrinier paper machine. Control runs were made using wood pulps only. The inclusion of straw pulp in these paper furnishes resulted in improved formation, bursting and tensile strength, and folding endurance. The tearing resistance of the straw-containing papers was somewhat lower than that of the controls but the reduction in tear was relatively small. It is evident from these preliminary data that straw pulp could be used to good advantage in improving many types of specialty papers.

AN IMPROVED METHOD FOR THE DETERMINATION OF BRAN AND GERM PARTICLES IN WHEAT FLOUR.

R. A. Larkin, M. M. MacMasters, and C. E. Rist.
Cereal Chem. 29(5): 414-419. September 1952.

A simplified method is described for the determination of bran and germ particles in wheat flour. The method consists essentially of staining the flour with 0.05 percent Crystal Violet, dispersing the starch and protein with 1.0 percent (.25 N) sodium hydroxide, and filtering on filter paper. The pieces of bran and germ appear as violet particles while endosperm cell walls and dispersed starch and protein, which are also deposited upon the filter paper, are colorless. The violet-colored particles may be counted or the color density measured to give an accurate evaluation of flour refinement.

MORE COB PROCESSING PLANTS.

E. C. Lathrop and T. F. Clark.

Chemurg. Digest 11(9): 4-8. September 1952.

The more recent developments in the industrial utilization of various components of corn cobs are discussed. At the present time 24 plants are producing cob products useful both in industry and in agriculture and are operating in the majority of the North Central states. This industry seems now to be established on a rather firm basis.

QUANTITATIVE PAPER CHROMATOGRAPHY OF D-GLUCOSE AND ITS OLIGOSACCHARIDES.

R. J. Dimler, W. C. Schaefer, C. S. Wise and C. E. Rist.

Analyt. Chem. 24(9): 1411-1414. September 1952.

A procedure for quantitatively determining the distribution of oligosaccharides in mixtures such as the acid or enzymic hydrolyzates of starch and related polysaccharides is described. It is based on using the anthrone reaction for the colorimetric measurement of the constituents resolved by paper chromatography and eluted from the paper. The procedure is applicable to resolvable polymers of glucose and fructose without need for knowledge of the types of linkage or molecular size of the compounds. The analyses on known mixtures generally were within 5 percent of theory.

REACTIONS OF TERTIARY BUTYL HYPOCHLORITE WITH VEGETABLE OILS AND THEIR DERIVATIVES. V. DECHLORINATION OF CHLORINATED SOYBEAN OIL WITH AQUEOUS SOLUTIONS OF SALTS.

H. M. Teeter and R. A. Myren.

Jour. Amer. Oil Chem. Soc. 29(9): 367-370. September 1952.

To prepare fast-drying oils from soybean oil, chlorinated soybean oil was dechlorinated by autoclaving with solutions of weakly basic salts. The products contained less chlorine and have better colors and viscosities than those dechlorinated thermally. Laboratory tests indicated that satisfactory paints and varnishes could be made from these oils.

RELATION OF ENDOSPERM CELL WALL THICKNESS TO THE MILLING QUALITY OF SEVEN PACIFIC NORTHWEST WHEATS.

R. A. Larkin, M. M. MacMasters, and C. E. Rist.

Cereal Chem. 29(5): 407-413. September 1952.

The thickness of endosperm cell walls of seven Pacific Northwest wheat varieties was determined microscopically and the relation of thickness to milling quality, as determined by the Western Wheat Quality Laboratory, was investigated. The outer tangential wall was thinnest (3.8 μ) in the aleurone cells, the radial wall the thickest (6.0 μ), and the inner tangential wall slightly thinner (5.5 μ) than the radial wall. Corresponding aleurone cell walls of the varieties differed in thickness, but the thickness was uncorrelated with milling quality. The starchy endosperm cell walls near the aleurone were about one-half thicker (4.0 μ) than those in the center of the kernel (2.6 μ). The walls in the area next to the crease were from two to two and one-half times thicker (7.3 μ). A good correlation was found between milling quality and the thickness of the endosperm cell walls in the region from 20 to 200 microns from the aleurone. The possible use of this characteristic is suggested for predicting the milling behavior of new selections early in the wheat-breeding program.

RESEARCH STUDIES IN 1952 BY THE NORTHERN RESEARCH LABORATORY.

R. T. Milner

Soybean Digest 12(11): 54-55, 65. September 1952.

A résumé of the research studies under way on soybeans at the Northern Regional Research Laboratory during the fiscal year 1951-1952. What the Laboratory's work means to soybean growers and processors is related to results obtained from research on soybean protein, soy powder, soybean oil meal (particularly that solvent extracted with trichloroethylene), and the flavor stability problem of soybean oil.

STRUCTURE OF THE MATURE CORN KERNEL. I. GROSS ANATOMY AND STRUCTURAL RELATIONSHIPS.

M. J. Wolf, C. L. Buzan, M. M. MacMasters, and C. E. Rist.

Cereal Chem. 29(5): 321-382. September 1952.

Photographs at low magnification show the gross anatomy and structural relationships of parts of the mature corn kernel. The kernel is a fruit of the type called a caryopsis; it is composed of the germ, endosperm, seed coat, and pericarp. Discontinuity of the germ, endosperm, and hull facilitates their separation by industrial processing. Chemical constituents that are separated industrially lie in the endosperm and germ, which are protected by three concentric enveloping layers.

STRUCTURE OF THE MATURE CORN KERNEL. II. MICROSCOPIC STRUCTURE OF PERICARP, SEED COAT, AND HILAR LAYER OF DENT CORN.

M. J. Wolf, C. L. Buzan, M. M. MacMasters, and C. E. Rist.

Cereal Chem. 29(5): 321-382. September 1952.

Details of structure are shown in numerous photomicrographs. Several layers of different types of cells compose the pericarp; the epidermis is cutinized. The seed coat is a thin membrane which is fused at the base of the kernel to the hilar layer. Present knowledge concerning the role of these parts in the movement of water and chemicals and in the protection of the kernel from molds is discussed.

STRUCTURE OF THE MATURE CORN KERNEL. III. MICROSCOPIC STRUCTURE OF THE ENDOSPERM OF DENT CORN.

M. J. Wolf, C. L. Buzan, M. M. MacMasters, and C. E. Rist.

Cereal Chem. 29(5): 321-382. September 1952.

Numerous photomicrographs show the structural details. The aleurone layer surrounds the rest of the endosperm and the germ. In the starchy endosperm, the cells are filled with starch granules embedded in a proteinaceous matrix. There is a natural cleavage line between the germ and endosperm, but a thin layer of cementing material holds the two parts together.

STRUCTURE OF THE MATURE CORN KERNEL. IV. MICROSCOPIC STRUCTURE OF THE GERM OF DENT CORN.

M. J. Wolf, C. L. Buzan, M. M. MacMasters, and C. E. Rist.

Cereal Chem. 29(5): 321-382. September 1952.

The many different types of tissues are shown in photomicrographs. Partial differentiation of vascular and other tissues is evident in both the embryonic axis and the

scutellum. Most of the oil is contained in the parenchyma cells of the scutellum; the walls of these cells are profusely pitted. The epithelium invaginates into the scutellum to form numerous glands.

STUDIES OF WATER-INSOLUBLE HEMICELLULOSES OF THE ENDOSPERM CELL WALLS IN RELATION TO MILLING QUALITY OF SEVEN PACIFIC NORTHWEST WHEAT VARIETIES.

M. J. Wolf, H. L. Seckinger, E. C. Rosewall, M. M. MacMasters, and C. E. Rist.
Cereal Chem. 29(5): 399-406. September 1952.

The water-insoluble hemicelluloses of the endosperm cell walls of seven soft and semihard Pacific Northwest wheat varieties were studied as part of an investigation of the composition of the cell walls in relation to milling quality. Cross sections of kernels from which cell contents had been removed were treated with dilute acid hydrolyze the hemicelluloses, or with dilute alkali to dissolve them. On the basis of the area of endosperm in which cell walls were disintegrated by these treatments, the seven varieties fell into two groups. The best milling wheats were in the group in which most disintegration of the cell walls was found. The poor milling wheats were in the other group. However, wheats of intermediate milling quality fell into one or the other of the two groups. The water-insoluble hemicelluloses of the endosperm cell walls of the seven varieties were found to contain xylose, arabinose, and galactose in proportions unrelated to milling quality of the varieties.

VOLATILE CLEAVAGE PRODUCTS OF AUTOXIDIZED SOYBEAN OIL.

F. K. Kawahara and H. J. Dutton.
Jour. Amer. Oil Chem. Soc. 29(9): 372-377. September 1952.

Volatile odor principles of reverted soybean oil were collected at low temperature and fractionated by chromatography. Acetaldehyde, propionaldehyde, α -pentenal, and hexanal were identified as their 2,4-dinitrophenylhydrazone derivatives. There was evidence that crotonaldehyde was also present, although not completely resolved from the propionaldehyde as dinitrophenylhydrazone.

POLYHYDROXYALKANES FROM FURFURAL CONDENSATION PRODUCTS.

Charles R. Russell, Kliem Alexander, W. O. Erickson, L. S. Hafner, and L. E. Schniepp.
Jour. Amer. Chem. Soc. 74(18): 4543-4546. September 20, 1952.

Previous investigations have shown that furan rings having an alkyl substituent in the α position can be converted to 1,4-diols by a hydrolytic hydrogenation reaction. This procedure has now been used to prepare 1,4,7-triols from γ -(2-furyl)-alkanols. The course of the reaction is believed to involve the formation of a 4,5-dihydrofuran as an intermediate. Addition of water to this cyclic vinyl ether yields a cyclic hemiacetal which is converted to the hydroxy compound by further hydrogenation. Furylacrolein and mono- and di-furfural-acetones were the starting materials in this work. Best results were obtained by a two-step procedure in which (1) the condensation product was reduced over a copper chromite catalyst and (2) the resulting mixture of furylalkanol and spiroonane was hydrogenated in the presence of water and formic acid over a nickel-on-Celite catalyst. 1,4,7-Heptanetriol, 1,4,7-octanetriol, and 1-tetrahydrofuryl-3,6,9-nonanetriol, which are viscous, high-boiling, water-soluble liquids, were obtained in 40-50-percent yields. 1,4,7,10,13-Tridecanepentaol, a waxy solid, was also obtained, in low yield, as a product of the hydrolytic hydrogenation of difurfural-acetone.

PULP AND PAPER RESEARCH AT THE NORTHERN REGIONAL RESEARCH LABORATORY.

S. I. Aronovsky and E. C. Lathrop.

Paper Mill News 75(38): 92, 94, 96, 126. September 20, 1952.

A resumé of accomplishments of the Northern Laboratory on the evaluation of various agricultural residues for industrial utilization in the manufacture of pulp, paper and board products.

COUNTERCURRENT DISTRIBUTION OF METHYL ESTERS OF HIGHER FAT ACIDS.

J. A. Cannon, K. T. Zilch, and H. J. Dutton.

Analyt. Chem. 24(10): 1530-1532. October 1952.

Fundamental data for the fractionation of methyl esters by liquid-liquid extraction are presented.

DEXTRAN-DEGRADING ENZYMES FROM MOLDS.

H. M. Tsuchiya, Allene Jeanes, Helen M. Bricker, and C. A. Wilham.

Jour. Bact. 64(4): 513-519. October 1952.

This is a report of observations on the occurrence, production, and activity of certain mold enzymes that degrade dextran from *Leuconostoc mesenteroides* NRRL B-512 to di- and higher oligosaccharides. Twenty strains of *Penicillium lilacinum*, *P. funiculosum*, *P. verruculosum*, and *Spicaria violacea* were found to produce potent extracellular dextran-degrading enzymes in submerged culture. An amylase concentrate of *Aspergillus niger* NRRL 330 was also shown capable of degrading dextrans. The effect of pH on activity and stability of crude enzyme preparations is reported. The dextranase produced by *P. funiculosum* NRRL 1768, when cultivated on one type of dextran, displayed varying degrees of activity toward dextrans of different microbial origin. The same was true of the dextran-degrading ability of an amylase preparation of *A. niger* NRRL 330.

THE EFFECT OF CERTAIN CULTURAL FACTORS ON PRODUCTION OF DEXTRANSUCRASE BY LEUCONOSTOC MESENEROIDES.

H. M. Tsuchiya, H. J. Koepsell, J. Corman, G. Bryant, M. O. Bogard, V. H. Feger, and R. W. Jackson.

Jour. Bact. 64(4): 521-526. October 1952.

This study covered certain cultural factors that affect the production of dextran-sucrase by *Leuconostoc mesenteroides* NRRL B-512. It was found that the sucrose concentration in the medium should be held to a point such that viscosity of the culture was sufficiently low to permit the separation of bacterial cells (optimal 2 percent). The sources of nitrogen and other nutrients were required in concentrations higher than those used in the whole-culture production of dextran. The cultural pH (optimal 6.7) for the production of dextran-sucrase could be controlled by phosphate buffer of by continuous addition of alkali.

REACTIONS OF TERTIARY BUTYL HYPOCHLORITE WITH VEGETABLE OILS AND THEIR DERIVATIVES. VII. PARTIAL CHLORINATION OF SOYBEAN OIL.

H. M. Teeter, E. W. Bell, and L. C. Woods.

Jour. Amer. Oil Chem. Soc. 29(10): 401-402. October 1952.

As a means of improving the drying properties of soybean oil, partial chlorination with *t*-butyl hypochlorite followed by dehydrochlorination has been studied. Oils

chlorinated with 0.5 equivalent or less of hypochlorite were more completely dehydrochlorinated than oils treated with more than 0.5 equivalent of hypochlorite, and the residual halogen was found to be more stable to heat.

SOME EFFECTS OF ARTIFICIAL DRYING OF CORN GRAIN.

H. W. Gausman, J. H. Ramser, G. H. Dungan, F. R. Earle, M. M. MacMasters, H. H. Hall, and P. D. Baird.

Plant Physiol. 27(4): 794-802. October 1952.

Corn varying from 75 to 24-percent initial moisture content was artificially dried at high, medium, and low temperatures (approximately 180°, 130°, and 110°F., respectively) with controlled humidity and air velocity. Controls were ears air-dried at room temperature and ears frozen in the field with solid carbon dioxide and then lyophilized in the laboratory. The drying treatments had different effects upon different inbreds as shown by viability and by field performance as measured by yield. Immature corn was more brittle after artificial drying than after natural drying. Lyophilized samples contained more sugar and niacin, but less starch, than naturally dried samples. Corn artificially dried at temperatures of 180° and 130°F. from moisture contents above 40 percent contained more niacin, riboflavin, and total sugars, and less pantothenic acid, pyridoxin, and starch than the control samples. Samples artificially dried from initial moisture content of 65 to 69 percent gave, upon processing, lower starch recovery and concomitantly higher amounts of starch in fiber and protein fractions than did the naturally dried controls. The viability of the corn and the paste viscosity of the starch separated from it tended to be positively correlated, but the correlation was not statistically significant.

EVIDENCE OF NEW LINKAGES IN DEXTRANS.

Rolland Lohmar.

Jour. Amer. Chem. Soc. 74(19): 4974. October 5, 1952.

When certain dextrans are oxidized by periodate, some of the anhydroglucose units remain unattacked. This presumably indicates the presence of 1,3-linkages. Glucose has been demonstrated in periodate oxidized dextran from *Leuconostoc mesenteroides* NRRL B-742.

CYANOETHYLATION OF α -AMINO ACIDS. IV. N-2-CARBALKOXYETHYL DERIVATIVES.

L. L. McKinney, E. H. Uhing, E. A. Setzkorn, and J. C. Cowan.

Jour. Amer. Chem. Soc. 74(20): 5183-5185. October 20, 1952.

N-2-Cyanoethyl derivatives of alpha-amino acids were reacted with alcoholic hydrogen chloride to give N-2-carboalkoxyethyl derivatives of amino acid esters. The properties of these esters and of some of their N-acetyl and N-benzoyl derivatives are described.

PRODUCTION OF α -KETOGLUTARATE IN GLUCOSE OXIDATION BY PSEUDOMONAS FLUORESCENS.

Harold J. Koepsell, Frank H. Stodola, and Eugene S. Sharpe.

Jour. Amer. Chem. Soc. 74(20): 5142-5144. October 20, 1952.

Fermentation of glucose in synthetic media by *Pseudomonas fluorescens* has led to yields of 0.50 to 0.55 mole of α -ketoglutaric acid per mole glucose consumed with indications that the maximum possible yield may be considerably higher. Gluconate and 2-ketogluconate accumulated as intermediates, suggesting that glucose was

metabolized according to the hypothetical hexosemonophosphate shunt pathway. However, successive 1-carbon degradation up to the triose stage, as currently postulated for this pathway, is not consistent with the α -ketoglutarate yields obtained. A paper chromatogram procedure for following the course of fermentation is described.

ANALYSIS OF FAT ACID OXIDATION PRODUCTS BY COUNTERCURRENT DISTRIBUTION METHODS. IV. METHYL LINOLEATE.

Joseph A. Cannon, Karl T. Zilch, Stanley C. Burket, and Herbert J. Dutton.
Jour. Amer. Oil Chem. Soc. 29(11): 447-452. November 1952.

Methyl linoleate oxidized at room temperature to levels of 0.11, 0.62, and 1.12 moles oxygen per mole ester has been fractionated in the Craig countercurrent extraction apparatus. The weight distribution curves are composed of three peaks corresponding to: I-unoxidized methyl linoleate, II-methyl linoleate monohydroperoxide, and III-secondary oxidation products. These and other analytical results show a marked similarity between the autooxidations of methyl oleate and linoleate but a striking contrast to that of methyl linolenate.

CINNAMYCIN, AN ANTIBIOTIC FROM STREPTOMYCES CINNAMONEUS NOV. SP.

Robert G. Benedict, William Dvornch, Odette L. Shotwell, Thomas G. Pridham, and Lloyd A. Lindenfelser.
Antibiotics and Chemotherapy 2(11): 591-594. November 1952.

Preliminary studies have been made on the production, isolation, antimicrobial spectrum, and on the chemical properties of a new antibiotic, cinnamycin, obtained from *Streptomyces cinnamoneus* nov. sp. It is the first actinomycete polypeptide antibiotic found to have sulfide amino acids. Cinnamycin in the form of a hydrochloride salt is soluble in water, 80 percent methyl alcohol, 50 percent ethyl alcohol, water-saturated *n*-butyl alcohol, and glacial acetic acid; it is insoluble in ether. It is stable in the pH range of 2 to 9. Early laboratory tests showed the antibiotic to be effective as a growth inhibitor of *Clostridium botulinum* when the hydrochloride was assayed at a concentration of 0.085 micrograms per milliliter.

PROTEOLYTIC ENZYMES OF MICROORGANISMS. EVALUATION OF PROTEINASES PRODUCED BY MOLDS OF THE ASPERGILLUS FLAVUS-ORYZAE GROUP IN SUBMERGED CULTURE.

R. G. Dworschack, H. J. Koepsell, and A. A. Lagoda.
Arch. Biochem. and Biophys. 41(1): 48-60. November 1952.

Four hundred ninety-one strains of *Aspergillus flavus-oryzae* and related molds were tested for production of proteinases under submerged culture conditions. The molds were grown on a medium containing corn meal, whole soybean meal, and calcium carbonate. Analytical methods for rapid proteinase assay are described. When produced, the proteinases were found in the broth, free of the mycelium. Moderate or higher proteinase yields were found in 80 instances, and superior yields were obtained from 19 mold strains. The latter strains are listed and their proteinase activities described. Greatest proteinase activity in this group of molds was found at pH 7.5. Some strains were also active at pH 5.0, but none were active at pH 2.5. Ability to hydrolyze gelatin occurred more frequently than ability to digest casein, and milk-clotting activity was rare. High amylase activity in the mold filtrates occurred infrequently and was not associated with high proteinase activity.

DEXTRAN TRIACETATES.

Allene Jeanes and C. A. Wilham.

Jour. Amer. Chem. Soc. 74(21): 5339-5341. November 5, 1952.

A simple, non-degradative method is described for preparing dextran triacetates from dextrans in the form of either the hydrated gum or the dry powder. This method was applied to the acetylation of nine bacterial dextrans differing widely in chemical and physical characteristics. Intrinsic viscosities and specific rotations of the dextran triacetates showed close relationship to the corresponding data for the respective dextrans as well as to the periodate oxidation data for these dextrans. It was thus proved that differences among the dextrans are due to fundamental structural characteristics which are carried over into the triacetates. The degradation temperatures of these dextran triacetates, and the film-forming ability of one of them was shown to correlate with their chemical structure.

THE ELECTROLYTIC PREPARATION OF PERIODATE OXYSTARCH.

William Dvornch and C. L. Mehlretter.

Jour. Amer. Chem. Soc. 74(21): 5522-5523. November 5, 1952.

Starch can be oxidized by periodic acid in an electrolytic method in which a small amount of the acid is continuously regenerated. This suggests the utility of the method in preparative work where the selective oxidation of periodic acid is necessary but where its high cost has been prohibitive.

ZYMONIC ACID, A NEW METABOLIC PRODUCT OF SOME YEASTS GROWN IN AERATED CULTURE. I. STRUCTURE STUDIES.

Frank H. Stodola, Odette L. Shotwell, and Lewis B. Lockwood.

Jour. Amer. Chem. Soc. 74(21): 5415-5418. November 5, 1952.

A $C_8H_{10}O_5$ compound was obtained by the action of diazomethane on the acids from the yeasts *Trichosporon capitatum*, *Hansenula subpelliculosa*, and *Kloeckera brevis*. Saponification data, conversion to an amide and dianilide, and a C-methyl determination showed this product to be the methyl ester of a furane α -carboxylic acid containing methyl and methoxyl groups as ring substituents. Ease of decarboxylation of the free acid indicated the methoxyl group to be beta to the carboxyl. On the basis of these studies the acid as it exists in the culture liquor, is judged to be an equilibrium mixture of 3,5-diketo-4-methyltetrahydrofuroic acid and its enol.

A.O.C.S. COMMENTARY PUBLICATIONS ON FATS AND OILS.

J. C. Cowan.

Jour. Amer. Oil Chem. Soc. 29(12): 4, 18. December 1952.

This is a commentary of the literature available on fats and oils, including important periodicals and books.

ITACONIC ACID PRODUCTION BY FERMENTATION WITH ASPERGILLUS TERREUS.

Virgil F. Pfeifer, Charles Vojnovich, and Edward N. Heger.

Indus. and Engin. Chem. 44(12): 2975-2980. December 1952.

Experiments were conducted on a pilot-plant scale on the process for producing itaconic acid by fermentation of glucose solution with the mold *Aspergillus terreus*. The following factors affecting fermentation were investigated: sterilization methods,

antifoam agents, medium composition, inoculum, aeration and agitation, and fermentation pressure and temperature. Itaconic acid was recovered from the filtered beer by evaporation, crystallization, and centrifugation. Pure acid was recovered by carbon treatment of the crude material. Yields of itaconic acid of 60 percent, based on the anhydrous glucose supplied, were obtained, and 90 percent of the acid was recovered in crystalline form. Cost estimates indicate a total plant production cost of 28.0 cents per pound for 97 percent pure crystals, or 30.9 cents per pound for 99 + percent pure white crystals.

SOY-FLOUR BREAD WINS ITS PLACE. TESTS SHOW BEST AMOUNT FOR QUALITY LOAVES.

C. W. Ofelt, A. K. Smith, C. D. Evans, and Helen A. Moser.

Food Engin. 24(12): 145-149. December 1952.

Two breads, one containing 5 percent nonfat soy-flour, the other containing 4 percent nonfat dry milk solids, were prepared by commercial methods in commercial-size equipment. A flavor comparison of the crumb of these breads was made under controlled conditions, and the data obtained subjected to statistical analysis. There is no significant difference between the flavors.

VOLATILE CLEAVAGE PRODUCTS OF AUTOXIDIZED METHYL LINOLENATE.

F. K. Kawahara, H. J. Dutton, and J. C. Cowan.

Jour. Amer. Oil Chem. Soc. 29(12): 633-635. December 1952.

In a study to identify the flavor principles of reverted soybean oil, volatile cleavage products of autoxidizing methyl linolenate were chromatographically separated, and the aldehydes were isolated as 2,4-dinitrophenylhydrazones. Acetaldehyde, propionaldehyde, and α -pentenal have been identified. A six-carbon atom dialdehyde has been isolated and is postulated to be hexene-3-dial-1,6.

ACETYLATION OF AMYLACEOUS POLYSACCHARIDES.

Allene Jeanes and R. W. Jones.

Jour. Amer. Chem. Soc. 74(23): 6116-6118. December 5, 1952.

A comparative study was made of three widely used methods for acetylation of amylaceous polysaccharides. It appeared that the determining factor for rapid, complete, and homogeneous acetylation by any one of these methods is a uniformly reactive physical state of the polysaccharide. Viscosity measurements provided no evidence of degradation during acetylation of corn amylose preparations by any of the three methods. Acetylation by pyridine in the presence of formamide at room temperature was the preferred method from the standpoint that the polysaccharides could be used dry, wet, or complexed. Also, the products had the superior property of dissolving in certain solvents in which the products from other methods were insoluble.

REACTIONS OF TERTIARY-BUTYL HYPOCHLORITE WITH VEGETABLE OILS AND THEIR DERIVATIVES. VI. DECHLORINATION OF METHYL ALKOXYCHLOROSTEARATES WITH ALKALI.

Lyle E. Gast, Dolores R. Zilch, Lyle C. Woods, and Howard M. Teeter.

Jour. Amer. Chem. Soc. 74(24): 6280-6281. December 20, 1952.

Several methyl alkoxychlorostearates and methyl acetoxychlorostearate were dehydrochlorinated with alcoholic potassium hydroxide in an autoclave to produce ketostearic acid in yields of 5 to 68 percent.

RECENT ADVANCES IN THE TAXONOMY OF YEASTS.

Lynferd J. Wickerham.

Ann. Rev. of Microbiol. 6: 317-322. 1952.

This paper discusses, in the light of the author's experience and concepts of the classification of yeasts, the various contributions to the literature on yeast taxonomy made since 1948. The paper was prepared for Volume 6 of the "Annual Review of Microbiology" and deals particularly with a currently new book on yeast taxonomy by Dr. J. Lodder and Mrs. N. J. W. Kreger-van Rij.

*TERTIARY BUTYL HYPOCHLORITE.

H. M. Teeter and E. W. Bell.

Pages 20-22 of book entitled "Organic Syntheses," Vol. 32, John Wiley and Sons, New York, N. Y., 1952.

A convenient procedure for the preparation of tertiary butyl hypochlorite is described.

*1,6-ANHYDROHEXOFURANOSES, A NEW CLASS OF HEXOSANS.

R. J. Dimler.

Pages 37-52 of book entitled "Advances in Carbohydrate Chemistry," Vol. VII, Academic Press, New York. 1952.

Two representatives of a new class of glycosans containing a $\langle 1,4 \rangle \langle 1,6 \rangle$ (or 1,6-anhydrofuranose) ring system have been isolated from the products of pyrolytic vacuum distillation of carbohydrates. They are 1,6-anhydro- β -D-glucofuranose or D-glucosan $\langle 1,4 \rangle \beta \langle 1,6 \rangle$ and 1,6-anhydro- α -D-galactofuranose or D-galactosan $\langle 1,4 \rangle \alpha \langle 1,6 \rangle$. These new glycosans are noteworthy in two respects. The 1,2-diol group in each is resistant to oxidative cleavage by paraperiodic acid, sodium metaperiodate, and lead tetraacetate under conditions accepted for the detection and estimation of adjacent hydroxyl groups. In addition, these glycosans do not show the ease of acid hydrolysis which might be expected in view of their "internal" hexofuranoside structure. The relationship between these properties and the structure of carbohydrates is discussed, following a review of the preparation and proof of structure of the two 1,6-anhydrohexofuranoses. It is concluded that the absence of oxidative cleavage by periodate ion or lead tetraacetate cannot be taken, without reservation, as proof of the absence of 1,2-diol structures.

REPUBLICATIONS

DEXTRAN--A SELECTED BIBLIOGRAPHY.

Allene Jeanes.

U. S. Dept. Agr. AIC-288 (Rev.), 42 pp. (Processed.) June 1952.

[Previously published as AIC-288, October 1950.]

PULPS FROM STRAW AND SUGARCANE BAGASSE FOR MANUFACTURE OF NEWSPRINT.

E. C. Lathrop.

Indian Pulp and Paper VII(1): 57-59. July 1952.

[Previously published as U. S. Dept. Agr. AIC-327, January 1952.]

THE CHARACTERISTICS OF PULP FIBERS FROM AGRICULTURAL RESIDUES.

Elbert C. Lathrop.

TAPPI 35(11): 60A, 62A, 64A, 66A, 68A. November 1952.

Tropical Woods and Agricultural Residues as Sources of Pulp (A Symposium) (A book of papers presented at the FAO Technical Committee on Wood Chemistry, Appleton, Wisconsin, September 1951) pp. 151-162. December 1952. Rome, Italy.

[Previously published as U. S. Dept. Agr. AIC-323, January 1952.]

RECENT ADVANCES IN PULPING STRAW IN THE UNITED STATES.

S. I. Aronovsky.

Tropical Woods and Agricultural Residues as Sources of Pulp (A Symposium) (A book of papers presented at the FAO Technical Committee on Wood Chemistry, Appleton, Wisconsin, September 1951) Pp. 178-189. December 1952. Rome, Italy.

[Previously published as U. S. Dept. Agr. AIC-324, December 1951.]

CONTRACT RESEARCH PUBLICATIONS

(NRRL research under contract with outside agencies)

INEFFECTIVENESS OF ARGININE IN OVERCOMING SOYBEAN GROWTH INHIBITOR IN THE CHICK.

C. H. Hill, R. Borchers, and C. W. Ackerson, Department of Agricultural Chemistry, University of Nebraska, Lincoln, Nebraska. (A report of work done under contract with the U. S. Department of Agriculture and supervised by the Northern Regional Research Laboratory of the Bureau of Agricultural and Industrial Chemistry.) Poultry Sci. 31(6): 1098-1100. November 1952.

Arginine is ineffective in counteracting the growth inhibitor in raw soybean oil meal when fed to chicks.

**ADD TO AIC-318, Supplement 2

*SOYBEAN OIL AND METAL INACTIVATORS.

J. C. Cowan.

Potato Chipper 11(11): 8, 10, 12. June 1952.

The effect of metals and metal inactivators on the stability of soybean oil is discussed.

A NEW DISACCHARIDE PRODUCED BY LEUCONOSTOC MESENTEROIDES.

F. H. Stodola, H. J. Koepsell, and E. S. Sharpe.

Jour. Amer. Chem. Soc. 74(12): 3202-3203. June 20, 1952.

A new crystalline disaccharide, designated "leucrose," has been isolated from a modified enzymatic synthesis of dextran by *Leuconostoc mesenteroides* from sucrose. It has been shown to be a D-glucosyl-D-fructose. The point of union is probably in the 5-position, judging from studies on the phenylosazone which involved periodate cleavages and comparison of X-ray patterns.

**Notice of publication received after preparation of last issue.

PATENTS

[These patents are assigned to the Secretary of Agriculture. Copies of patents may be purchased from the U. S. Patent Office, Washington, D. C.]

ANTIBIOTIC PRODUCTION FROM STREPTOMYCES GRISEO-CARNEUS.

Robert G. Benedict and Frank H. Stodola.

U. S. Patent 2,617,755. November 11, 1952.

Streptomyces griseo-carneus, a microorganism recently isolated from the soil, is cultivated to produce a streptomycin-like antibiotic.

STABILIZATION OF GLYCERIDE OILS.

Cyril D. Evans, Arthur W. Schwab, and John C. Cowan.

U. S. Patent 2,610,973. September 16, 1952.

Glyceride oils, such as soybean oil, cottonseed oil, peanut oil, mustard seed oil, and corn oil are stabilized against oxidative deterioration by the addition of small amounts of phytic acid. The stabilizer is particularly effective in the presence of metallic impurities, such as iron, copper, nickel, and cobalt.

SLURRY ADSORPTION SEPARATION AND FRACTIONATION OF SUGARS.

Edna M. Montgomery, Howard F. Conway, and Francis B. Weakley.

U. S. Patent 2,610,931. September 16, 1952.

Aqueous solutions containing a mixture of sugars difficult to separate are fractionated by contact with adsorbent carbon. A slurry is made with the finely divided carbon, sufficient carbon being used to adsorb all sugars present except glucose; the more difficultly separable sugars being adsorbed collectively. The sugars are recovered from the carbon by displacement with phenol, acetic acid, or ephedrine.

SKIN CLEANING COMPOSITION.

Leonard L. McKinney and John C. Cowan.

U. S. Patent 2,610,153. September 9, 1952.

Residual soybean meal, obtained as a by-product from commercial extraction of oil from soybeans, is treated with formaldehyde and ground to about 20 mesh size or smaller. This material is utilized as a mild abrasive in skin cleaning compositions, such as hand soap.

PROCESS FOR THE PRODUCTION OF AMYLOSE FILMS.

Ivan A. Wolff, Howard A. Davis, James E. Cluskey, and Laetta J. Gundrum.

U. S. Patent 2,608,723. September 2, 1952.

Self-supporting films, suitable for wrapping, are prepared from amylose or from starch mixtures consisting predominately of amylose. Amylose, or starch mixture containing it, is mixed with an aqueous solution of an amylose complexing agent having appreciable solubility in water (butanol) and the mixture heated to form a clear solution. The complexing agent is then removed, as by azeotropic distillation, and the remaining solution is cast upon a smooth surface and dried. The casting solution

may also contain plasticizers, dyes, fillers, and the like, and the film-forming operation may involve spraying or dip-coating instead of casting.

N, 2-CARBOALKOXYETHYL DERIVATIVES OF ALPHA-AMINO ACIDS AND OF ACYLATED ALPHA-AMINO ACIDS.

Leonard L. McKinney, Eugene H. Uhing, Eugene A. Setzkorn, and John C. Cowan.
U. S. Patent 2,607,797. August 19, 1952.

A new class of esters of dibasic amino acids is made from cyanoethylated amino acids by alcoholysis of the nitrile group. The amino acid starting material may be any of the natural or synthetic amino acids such as glycine, tyrosine, leucine, aspartic acid, methionine, or mixtures of amino acids such as obtained as a byproduct from the manufacture of monosodium glutamate. After cyanoethylation with acrylonitrile, the acids are reacted with an alcohol to form the diester. The products are useful in the production of plastics and pharmaceuticals.

STABILIZATION OF GLYCERIDE OILS WITH ACETONE DICARBOXYLIC ACID.

Arthur W. Schwab, Helen A. Moser, and Cyril D. Evans.
U. S. Patent 2,605,186. July 29, 1952.

Glyceride oils are stabilized against oxidative deterioration and the development of off-flavors and odors by the addition of a small amount (0.01 percent) of acetone dicarboxylic acid. The stabilizer may be added at any time during the treatment of the oil. Good results are obtained by adding it after the deodorization step, while the oil is cooling.

SHOCK-RESISTANT PRODUCT.

Elbert C. Lathrop and Theodore R. Naffziger.
U. S. Patent 2,603,156. July 15, 1952.

Hairlike, springy plant-fiber bundles are prepared from annual plant material such as wheat straw by cutting into lengths of about one inch, softening in water, and then subjecting to a rubbing action to form fiber bundles having the approximate thickness of animal hair. The product may be mixed with hydrated paper-making fibers and pressed into shape to form a shock resistant board. Boards containing 65 to 70 percent hairlike plant fibers and the remainder paper-making pulp may be used for making shot-gun shell wads. The density of the boards may be varied over a wide range, dependent upon the degree of pressing during the molding operation.

PROCESS FOR THE MANUFACTURE OF SODIUM GLUCONATE.

Charles Kenneth Crocker, Andrew J. Moyer, and Virgil F. Pfeifer.
U. S. Patent 2,602,768. July 8, 1952.

Sodium gluconate is produced directly by fermentation of glucose media. The acidity of the media is controlled between the pH 5.0 and 7.5 by adding increments of a sodium base. Sodium gluconate is recovered from the fermentation liquor by evaporation and crystallization.

APPARATUS FOR CLEANING CANS.

Thomas F. Clark.

U. S. Patent 2,601,746. July 1, 1952.

Cans, such as milk cans, are cleaned in an apparatus which blasts the surfaces with soft grits. The grits may be ground corncobs, rice hulls, or nut shells. The can is placed in an enclosed space where it revolves and is subjected to cleaning blasts from vertically moving nozzles, situated so as to blast the inner and outer surface.

